

A NEW ARCTOCYONID FROM THE UPPER EOCENE OF LUSHIH, HONAN

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The fossils which form the subject of the present study were collected in 1957 by the writer and his associates from the upper Eocene beds of Lushih, Honan Province. The mammalian fauna of Lushih containing abundant remains of *Mesonyx*, *Eudinoceros* (?), *Desmatotherium*, *Lophialctes*, *Rhinotitan*, *Microtitan*, *Amyrnodon*, ? *Dichobune*, *Gobiohyus* etc. has most of the species in common and can be closely correlated with the Irdin Manha fauna of Inner Mongolia the age of which is now generally regarded as early Late Eocene.

The presence of the arctocyonid creodont in the beds is of considerable interest, because it is the first definite record of the occurrence of this family in Asia and represents the last survival of this group beyond Early Eocene. The two genera *Ardynictis* and *Didymoceras* from the lower Oligocene Ardyn Obo of Mongolia which are sometimes doubtfully referred to this group (Simpson, 1949) belong most probably to Oxyaenidae rather than Arctocyonidae.

Description of the New Species

Family Arctocyonidae

Genus *Paratriisodon*, gen. nov.

Genotypic species: *Paratriisodon henanensis*, sp. nov.

Diagnosis: Size very large. Teeth tritubercular, massive, robust, with blunt-pointed cusps. Upper molars wider than long, M^3 slightly reduced, hypocone absent (with possible exception of M^1). Lower premolar large, trigonids raised moderately above the tyloids, M_3 extended behind to form a small but separately rooted heel (hld). Mandible comparatively long and shallow, with long, loose symphyseal contact and large, shallow masseteric fossa.

Paratriisodon henanensis, sp. nov.

Diagnosis: As for the genus given above.

Material: Fragmentary maxilla with M^{2-3} ; a crushed skull and a lower jaw of the left side belonging to the same individual as the skull; several complete or

broken isolated upper and lower cheek teeth, etc. Cat. No. V.2409.1. V.2409.2. V.2409.3. V.2411, V.2412, V.2413.1—8.

Horizon and Locality: Lower part of Upper Eocene, Menchiapu, Lushih, Henan (= Honan).

Description:

The characters of the dentition and the detail structure of the teeth are known compositionally from several specimens, because all the teeth are either much worn or broken except those of the two last upper molars which are represented by well preserved unworn specimens. There is a crushed skull with most of the upper cheek teeth preserved *in situ* and can be referred to this same species with certainty. But it is so badly crushed and all the teeth are so much worn that nothing more than the broad outline of the teeth can be learned from it. Of the anterior upper teeth only the two posterior premolars (P^{3-4}) which are preserved on the crushed skull are available for observation. The third premolar is quite similar in general outline but seems to be simpler than that of *Triisodon* (f. i. *T. antiquus*). The last upper molar is triangular, wider than long and transversal in position.

Upper molars—The first molar is merely equal or slightly smaller than the second one. It is subtriangular in outline and with the lingual apex inclined forward. The single tooth preserved on the skull is much worn to show the detail structure, but there is a slightly swollen area on the internal posterior corner possibly indicating the presence of a small hypocone. Of the second molar we have three comparatively better preserved isolated teeth for observation. The tooth is triangular, much broader than long, massive and with three conical main cusps and two less developed conules in connection with the protocone. The cingulum is well developed and nearly continuous on all sides or interrupted only on the internal side of the protocone. There is on the cingular shelf posterior to the protocone a small cusp-like swelling which may represent the rudiment of the hypocone. The last upper molar is the best represented one of the whole dentition. There are several specimens which are well preserved enough to show all the detail of the tooth. The six teeth in the collection show certain degree of variation in size and in the stage of development of certain structural parts. The tooth is in general much wider than long and narrows posteriorly and internally. The metacone is in one case nearly equally developed as the paracone, while in all the other cases this cusp is much inferior in size than the paracone and postcone. Likewise all the protoconule and metaconule which are quite strongly developed in some which "correspondingly" have stronger metacone, while in others they are only weakly developed as accessories to the protocone. The bluntly conical protocone and the metacone are nearly of equal strength. The enamel of molars is thin and is rather rugose.

Mandible and lower teeth—Two mandibular rami, one of which is comparatively well preserved, belong to the same individual as the skull, for they are found in close association and well matched in size and the teeth show same stage

of wear as the upper ones. The lower jaw bone is characterized by its long, straight and relatively shallow horizontal ramus. The symphyseal part is very long, extending backward to the posterior of P_3 and with loosely connecting area. The ventral border is rather straight but forms a broad curve posteriorly and tilts slightly upward anteriorly. All the teeth from C to M_3 are preserved on the better preserved specimen (a left mandibular ramus) except the P_1 which is missing but are preserved on the right side, of which only the anterior is preserved. The lower canine is rather strong, of oval section and pointed forward as in P_1 . It has an anteroposterior diameter of 34 mm. All the four premolars are high conical teeth, progressively increase in size posteriorly. The first and second pm are simple, while the third and fourth pm have a small accessory posterior cusps. The trigonids of all the molars are relatively highly elevated above the talonids. As nearly all the teeth are much worn or broken the structure of the teeth is difficult to ascertain. From the fragments available for observation it can be noted that the third lower molar are large and with a moderately developed heel, and the talonids are essentially bicusped and imperfectly basined due to the reduction of the entoconid, the hypoconid is entirely absent or has reduced to a small point on the comparatively strong posterior cingular shelf. The general appearance of the lower teeth (the upper ones, too) when much worn is very apt to be mistaken for these of a giant mesonychid.

Measurements (in mm.):

Palatal width between external wall of M^3	148
Length, P^3 — M^3	155
Length \times width, P^3	32×22.4
Length \times width, P^4 (approx.)	30×35
Length \times width, M^1	29×31
Length \times width, M^2	34×41.5 ; 34×40
Length \times width, M^3	34.5×45 ; 29×43
Length of mandibular ramus, ant. of C to post. of M_3	318
Length of symphyseal contact.....	165
Depth, at C and behind M_3	40, 83
Length, P_1 —4	160
Length, M_1 —3.....	140
Max width, M_3	2

Comparison:

As far as the available parts of comparison are concerned the reference of this new form from Lushih, Honan, to Arctocyoniidae is fairly certain and the further reference of it to the Subfamily Triisodontinae is likewise reasonable. For it can be in many important respects closely compared with the genus *Triisodon* of which *T. antiquus* (Cope) from the Puerco Paleocene of North America shows even closer resemblance. The upper cheek teeth pattern of these two species are basically very similar. The few important points of difference that are readily observed on the Chinese form are that:

(1) the last upper molar is only slightly reduced; (2) there may be a rudimentary trace of the hypocone on M^1 ; (3) the premolars are relatively larger; (4) the last lower molar has a well developed heel which is separately rooted, and the other minute differences, such as that the internal cusp on P^3 and the entoconid of lower molar are somewhat less developed in the Chinese form.

As a whole, as had been pointed out by Matthew (1937, p. 80) with regard to the *T. antiquus*, that these arctocyonids parallel the mesonychids in the specialization of the teeth. This remark seems to be more true for the new Chinese form.

In spite of the general resemblance and the differences noted above the new form is noticeable for its large size and its latter stratigraphical occurrence, that is from the early stage of late Eocene. A long gap (from middle Paleocene to middle Eocene inclusive) exists between the North American and the Chinese form stratigraphically and geographically.

Except for its unusually large size and latter occurrence the new form from Honan retains nearly all the fundamental primitive features characteristic of the early creodonts. The new genus represents probably the last survivals of this archaic group of carnivore in the Eocene of China and had reached gigantic size. We have to look forward in the formation of earlier geological age in Asia to trace its phyletic relationship with the North American forms.

***Paratriisodon* sp.**

Material:—A molar fragment from the same district and probably the same horizon (or slightly higher). V 2410.

There is in the collection several tooth fragments of an arctocyonid-like creodont which are of interest for its unusually large size, volumetrically more than double in comparison with the preceding species. One fragment (Text Fig.) which is the lingual part of an upper molar is better preserved enough to show its affinity with the above described genus. The fragment is with the protocone well preserved. It is an enormous, massive, and bluntly conical cusp, on the inward side of which there are two small accessory cusps which are basically identical with the protocune and metacune in a typical triisodont molar but much reduced in size. Besides there are other fragments in the collection which are for the most part without doubt belong to the same form but it is difficult to make definite identification.

In spite of its uncertainty due to scantiness of material it indicates the presence in the upper Eocene beds of Lushih a much larger form of triisodont-like arctocyonid matching or even surpassing *Andrewsarchus*, the largest known land carnivorous mammal in size. It is another interesting instance of the occurrence of the mammal giants in the Mongolian and North China region during the Paleocene time.

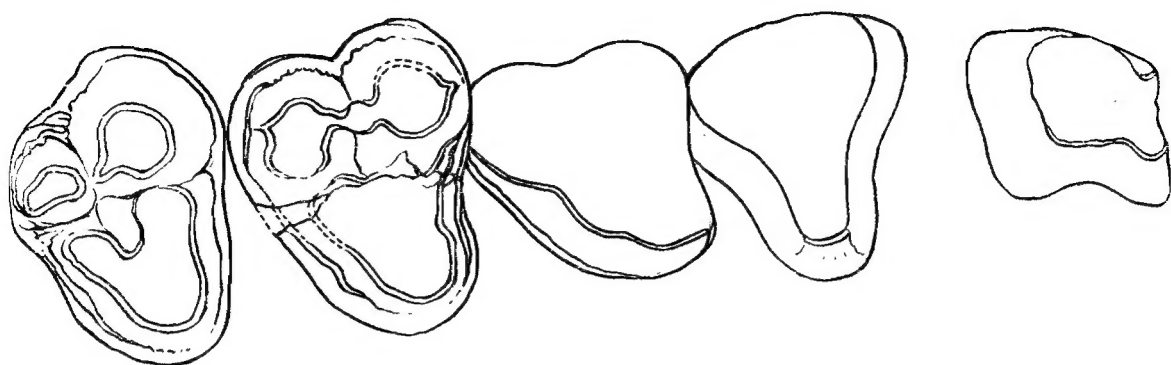


Fig. 1 *Paratriisodon henanensis* sp. nov.
Composite sketch of upper dentition $\times 1$.

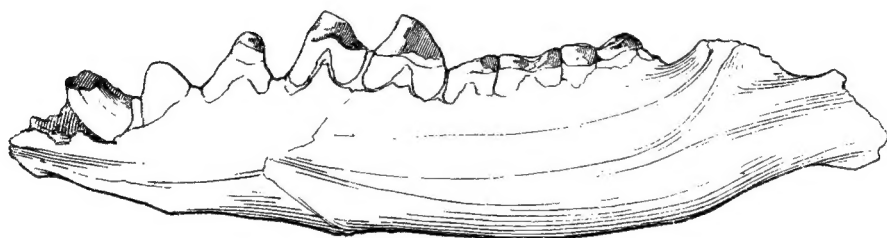


Fig. 2 *Paratriisodon henanensis* sp. nov.
Lower jaw with much worn lower dentition $\times \frac{1}{8}$.

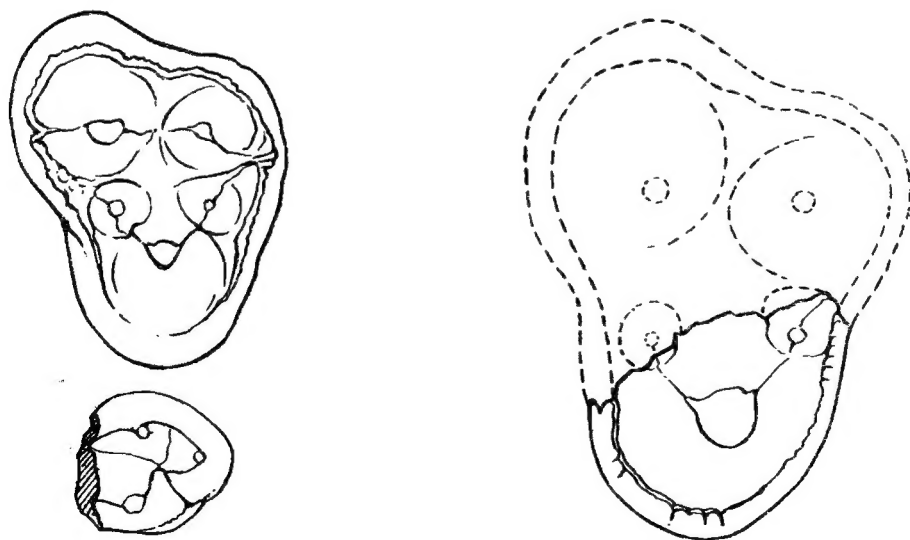


Fig. 3 Left *Paratriisodon henanensis* sp. nov.
Upper— M^3 (V. 2411), Lower—posterior of M_3 ; Right—*Paratriisodon* sp. (restored) $\times 1$.

References

- [1] Matthew, W. D., 1937. Paleocene Faunas of the San Juan Basin, New Mexico. *Tran. Amer. Phil. Soc.*, n. s. Vol. XXX.
- [2] Simpson, G. G., 1945. The Principles of Classification and a Classification of Mammals. *Bull. Amer. Mus. Nat. Hist.* Vol. 85.
- [3] Teilhard de Chardin, P., 1922. Les Mammifères de L'Eocène Inferieur Français. *Ann. Paleont.* Vol. II.

EXPLANATION OF PLATE I

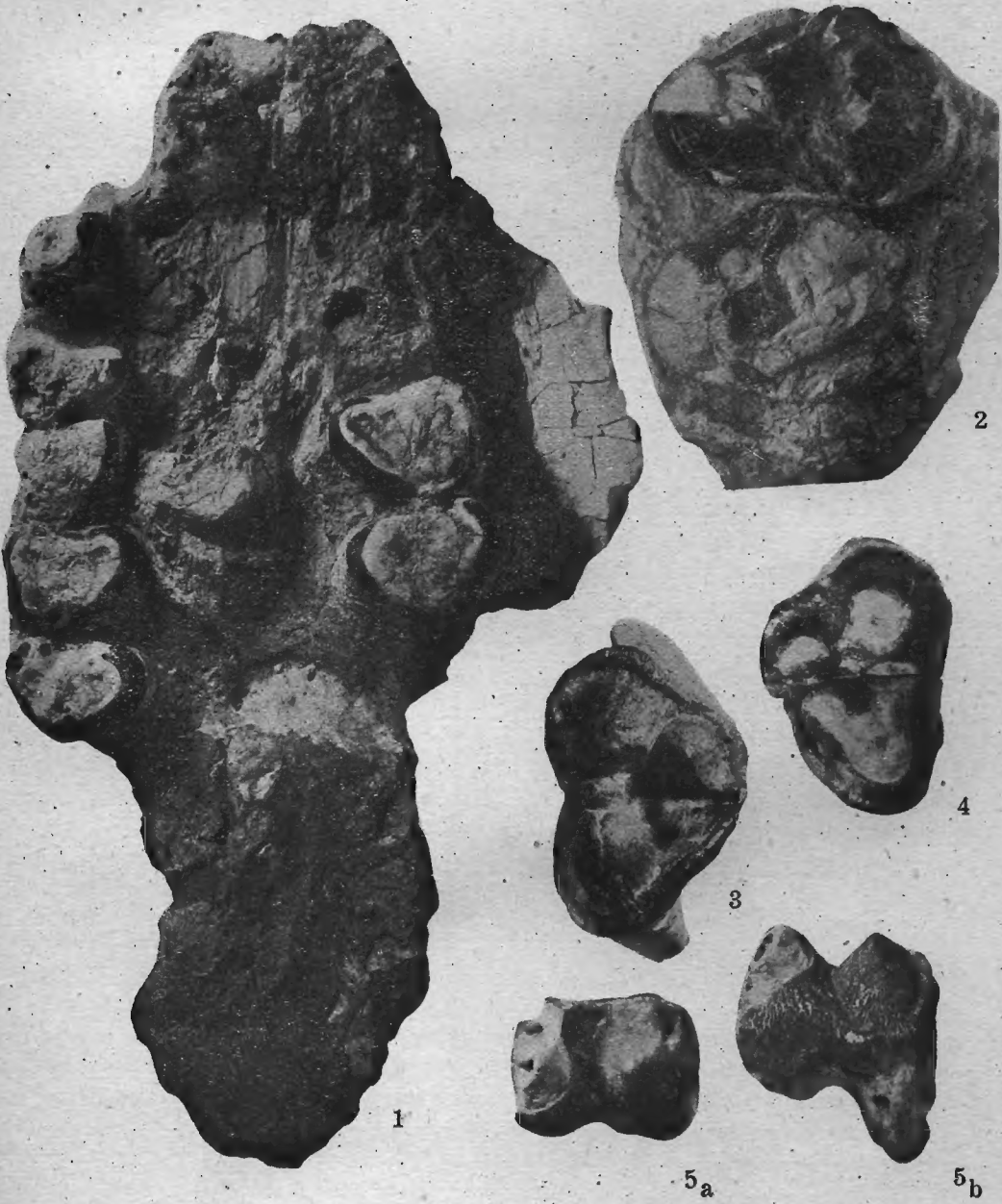
Paratriisodon henanensis sp. nov.

- 1. Upper jaw with worn upper cheek teeth, crown view. V. 2409.1, $\times 1/2$.
 - 2. Right M^2 - M^3 , crown view, V. 2412, $\times 1$.
 - 3. Right M^3 , crown view, V. 2413.1, $\times 1$.
 - 4. Left M^2 , crown view, V. 2411, $\times 1$.
 - 5. Lower molar fragment, V. 2413.8, $\times 1$.
- 5a—Crown view; 5b—Later view.

EXPLANATION OF PLATE II

Paratriisodon henanensis sp. nov. V. 2409.2, $\times 1/2$.

1a—Later view; 1b—Crown view.



Chow: Arctocyoniid

Plate II

